STATUS OF GYPSY MOTH POPULATIONS AT GREENBELT ARMY CORPS OF ENGINEERS GREENBELT, MD

Prepared by

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INTRODUCTION

On September 7, 1989, USDA Forest Service personnel conducted a gypsy moth egg mass survey at the Greenbelt Army Corps of Engineers facility. The purpose of the survey was to determine the status of gypsy moth populations and determine if suppression activities are necessary in 1990. The Army Corps of Engineers has requested Forest Service financial and technical assistance to suppress gypsy moth populations on 247 acres in 1990.

METHODS

Gypsy moth survey plots were randomly selected based on available host trees (oaks), size of sample areas, uniformity between egg mass counts, areas proposed for treatment, and available time. At each sample point, a 5-minute walk was conducted. The survey technique consisted of 2 observers casually walking in the same direction from the same starting point within the survey area for a period of 5 minutes. The number of new egg masses observed was then averaged and the number of egg masses per acre determined as follows:

$$Y = 20.56X + 14.58$$ [1/]

where,

Y = egg masses per acre

X = average number of egg masses observed during the 5-minute walk

RESULTS

Table 1 presents the egg mass survey results for each of the plot locations. Figure 1 shows the location of each plot. A total of 10 plots was established in the survey area. Egg mass densities averaged 2969 and ranged from 138-6039 egg masses per acre. Overall, the egg masses observed appeared large (size of a quarter or larger) and healthy. Except for two plots, high egg mass densities (greater than 500 em/acre) were essentially found throughout the survey area. In general, host-type trees (oaks) are abundant at this facility and were estimated to make up a large component of the forest-type.

DISCUSSION

The gypsy moth is subject to physical and biological factors that help to regulate population. The availability and suitability of food, site conditions, incidence of natural control factors (predators and parasites), inter- and intra-specific competition, weather effects, as well as many other factors that cannot be predicted at this time. The basic guidelines used to predict the degree of defoliation include evaluation of the past defoliation history of the area in question, number of egg masses/acre, size and condition

1/ Eggen D.A., and L.P. Abrahamson. 1983. Estimating Gypsy Moth Egg Mass Densities. State Univ. of NY, Coll. of Env. Sci. and Forestry, School of Forestry. Misc. Publ. No. 1 (ESF 80-002). 30 p.

of the egg masses, available preferred food, terrain and risk of larval blow-in following egg hatch. Potential defoliation is categorized as follows: light (1-30 percent); moderate (31-60 percent); and heavy/severe (61-100 percent).

The survey results indicate that gypsy moth populations are sufficiently high to cause heavy defoliation (61-100 percent) at the Greenbelt Army Corps of Engineers facility in 1990.

Three management options have been evaluated for managing gypsy moth populations at this Army facility. These options are offered based upon the following objectives: 1) protecting host tree foliage; 2) preventing tree mortality; and, 3) reducing gypsy moth populations. Each is discussed below.

No Action Option

It is possible that gypsy moth populations could collapse of their own accord due to the presence of NPV (nucleopolyhedrosis virus). Although it is not possible to accurately assess such an event with the information at hand, the large egg mass size and the recent population build-up suggest that the population as a whole is still building and a collapse is not likely to occur in 1990. In areas with defoliating level gypsy moth populations (greater than 250 egg masses per acre) viral epizootics generally manifest themselves after significant tree defoliation has already occurred. In areas where defoliation occurs, but where the trees do not need to refoliate, there probably is not any significant impact on the trees. At worst, there may be a reduction in the rate of growth during that season. However, in areas that are heavily defoliated, and where the trees must expend valuable energy reserves to refoliate, the stage is set for significant impacts (branch dieback and mortality) depending upon tree condidition at the time of defoliation.

Trees at greater risk are those that are presently stressed from other factors, such as: 1) soil compaction from sidewalks, parking lots, machinery and/or heavy foot travel; 2) over maturity; 3) drought; 4) shock due to recent timber cutting activities; 5) previous year(s) defoliation; and 6) other insect or disease related problems.

Chemical Insecticide Option

The second option is to use a chemical insecticide to control gypsy moth populations. Dimilin® (diflubenzuron) is the most widely used chemical insecticide in gypsy moth suppression projects in the Northeast. Diflubenzuron is an insect growth regulator that disrupts the normal molting processes of immature larvae. The mode of action is to inhibit the formation of chitin, a necessary component of the outer cuticle which causes the affected larvae to die during the molt following treatment. The method of uptake is primarily by ingestion, however, recent research has indicated the possibility of absorption through the cuticle as well.

Dimilin is registered by EPA for use in residential areas. It is, however, extremely toxic to aquatic invertebrates, and should not be applied to open water or wetlands. The Maryland Department of Agriculture's current policy on the use of Dimilin is to provide a minimum of a 100 foot no-spray buffer around open waterways and wetland areas. Dimilin is available as a 25 percent wettable powder formulation, and the recommended application rate is 1-4 ounces

per acre applied in one treatment. With proper application, foliage protection and population reduction of about 90 percent can be expected.

Microbial Insecticide Option

The third option is to use a microbial insecticide to manage gypsy moth populations. The only biological insecticide currently available for gypsy moth control is a microbial insecticide called Bacillus thuringiensis variety kurstaki. This insecticide is available by a variety of manufacturers and has been used extensively in suppression projects throughout the Northeast in both forested and residential areas. B.t. is a bacterium that acts specifically against lepidopterous larvae as a stomach poison and therefore must be ingested. The major mode of action is by mid-gut paralysis which occurs soon after feeding. This results in a cessation of feeding, and death by starvation.

B.t. formulations are available as flowable concentrates, wettable powders, and emulsifiable suspensions. The normal application rates range from 12-20 BIUs per acre in a single application and 12-16 BIUs in double applications. Both single and double applications are usually applied in 0.75-1.0 gallon of total mix per acre and commonly include a spreader/sticker additive at the rate of 2 percent by volume. With proper application, foliage protection and population reductions of about 70 percent can be expected.

Alternatives

With the previously described options in mind, the following four (4) alternatives are offered.

Alternative 1. -- No action.

Alternative 2. -- Single application of Dimilin applied aerially at the rate of 2 ounces (formulated material) in 128 ounces of water per acre.

Alternative 3. -- A single aerial application of B.t. applied at the rate of 12-20 BIUs per acre in 3/4-1.0 gallon per acre total mix. An appropriate spreader/sticker should be added at the rate of 2 percent by volume.

Alternative 4. -- Two aerial applications of B.t. at the same rate as that discussed in Alternative 3. The second application should be applied 7-10 days following the first.

RECOMMENDATIONS

Gypsy moth populations throughout the survey area are high enough to cause wide-spread heavy defoliation in 1990. As a result, some direct action will need to be taken in order to protect tree foliage and reduce gypsy moth populations.

Based on existing populations and the gypsy moth management objectives previously discussed, the entire forested area at this Corps facility meets common treatment criteria. The results of this survey should be used in conjunction with your resource management objectives to assess the potential impact that both heavy defoliation and possibly tree mortality would have in meeting your management goals. Predicting the extent of tree mortality that would occur after one year's defoliation is difficult. Generally speeaking however, a stand of trees that is not stressed by other agents during or immediately following a single heavy defoliation will likely pull through with only minor branch dieback. Trees that have been subjected to two or more years' defoliation or trees that are stressed by other agents will have the greatest risk of mortality.

An example of the potential impact in terms of dollar value is a damage appraisal conducted by the Pennsylvania Bureau of Forestry on 255,290 acres following a gypsy moth epidemic. The loss assessment showed that tree mortality that occurred between 1984-87 averaged $174.49 per acre (using 1987 stumpage values). On the Allegheny National Forest in untreated stands consisting of 40-80% oak, the average loss of basal area (mainly oaks) was about 16 percent (Range 3-28 percent) following one year's defoliation and 26 percent (Range 10-43 percent) after two consecutive years' defoliation.

The alternatives offered are based on insecticides and application rates that are currently used and registered by the EPA. Our recommendations for the most effective means of suppressing gypsy moth populations at the Greenbelt Corps facility are listed in order of preference below.

Alternative 2 or 4 and to a lesser degree
of effectiveness, Alternative 3.

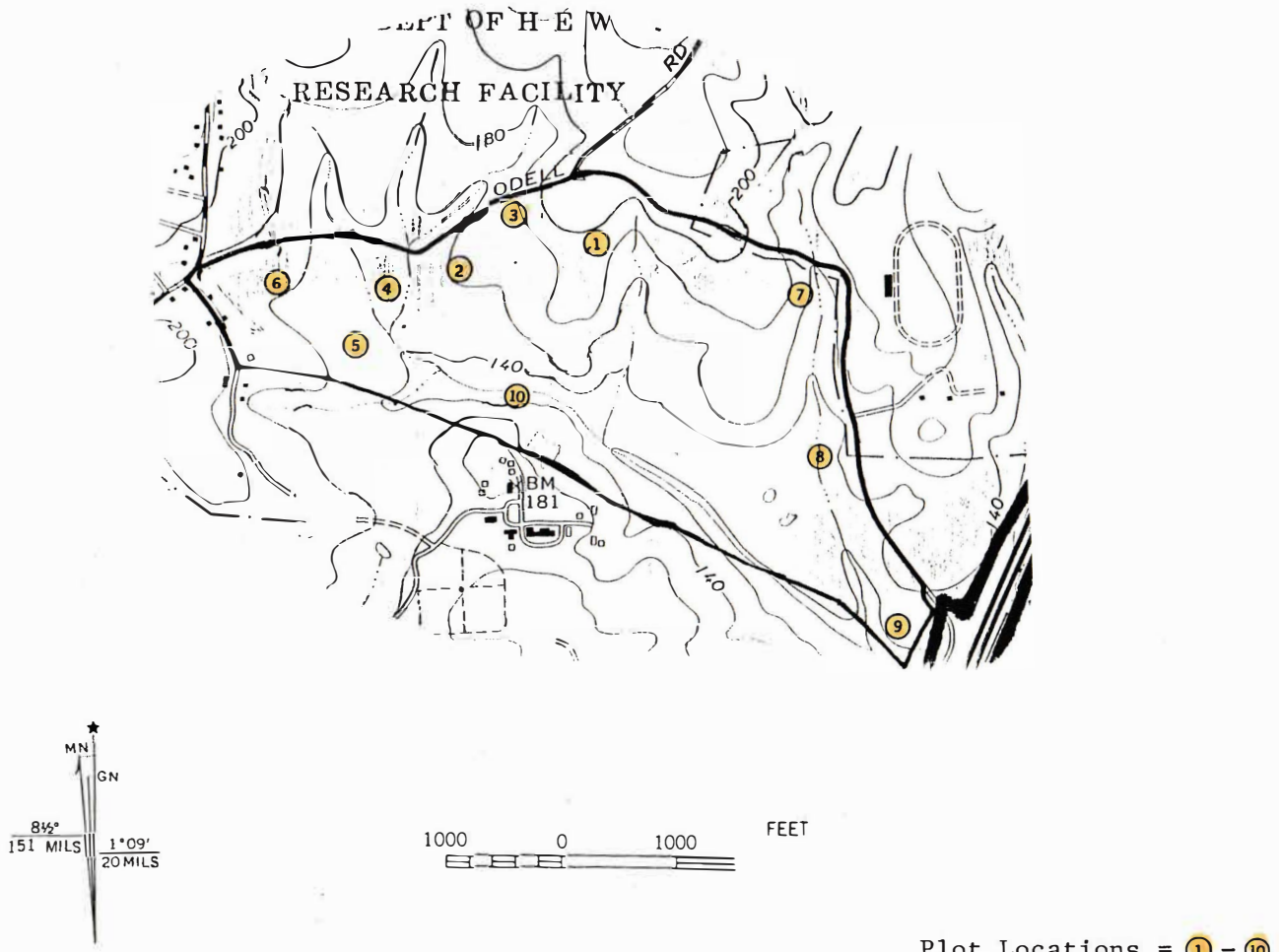
Other federal agencies in your area (Fort Meade, Goddard Space Center, National Park Service, Agricultural Research Center) have also proposed to treat gypsy moth populations in 1990. Logistically, it would be to everyone's advantage to take a cooperative approach to contract and conduct the application(s). Our office would be happy to help coordinate this effort.

Table 1. -- Gypsy Moth Egg Mass Survey Results at Greenbelt Army Corps of Engineers, September 7, 1989.

Plot Number	Egg Masses/Acre
1	7951
2	138
3	3489
4	220
5	179
6	3467
7	1598
8	1762
9	6039
10	4846

Average = 2969 egg masses/acre
Range = 138-6039 egg masses/acre

Figure 1.--Gypsy Moth Egg Mass Survey Plot Locations at Army Corps of Engineers Greenbelt, MD Site, September 7, 1989.



United States Department of Agriculture | Forest Service | Northeastern Area State and Private Forestry | 180 Canfield St. Morgantown, WV 26505

Reply To: 3460

Date: November 1, 1989

James S. Turkel
Real Estate Division
Realty Services Field Office
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Dear Mr. Turkel:

Enclosed is a biological evaluation summarizing the current status of gypsy moth populations at your facility. Included in the report are several alternatives and control measures that can be implemented. Essentially, gypsy moth populations are high enough to cause widespread heavy (61-100 percent) defoliation in 1990 throughout the Greenbelt Corps facility.

The recommendations found in this report are based on the following gypsy moth management objectives: 1) protect host tree foliage; 2) prevent tree mortality; and 3) reduce gypsy moth populations. Based on these objectives, we support your proposal to treat 247 acres at this site.

Prior to the final treatment area selection however, we encourage you to evaluate the treatment proposal in terms of your resource management objectives and determine the potential impact (as discussed in the report) gypsy moth may have in meeting your management goals. At present there are several other federal properties (Fort Meade, Patuxent Wildlife Research Center, National Park Service, NASA) proposing gypsy moth suppression activities in your area. It would be advantageous for everyone concerned to take a cooperative approach to conducting the program. Our office would be happy to help coordinate these efforts.

We look forward to working with your staff, and don't hesitate to call should you have questions regarding this report or the treatment proposal.

Sincerely,

Brad Onken

for NOEL F. SCHNEEBERGER
Entomologist
Forest Pest Management

Enclosure

cc: AO
Les Purcell
Robert Tichenor

BPO/mae